

PRELIMINARY RESULTS OF CATHODOLUMINESCENCE SPECTRAL ANALYSIS OF β -CA-PHOSPHATES (“WHITLOCKITE”) IN THE MARS METEORITE ALH84001. W.J. Protheroe Jr.¹, J.A.R. Stirling², ¹8711 Beau Monde, Houston, TX 77099-1107, corvos@aol.com. ²Geological Survey of Canada, 601 Booth St., Ottawa, ONT, Canada K1A 0E8, jstirlin@nrcan.gc.ca

Three mineral grains of β -Ca-phosphates were found during a cathodoluminescence (CL) imaging study of grain mounts of the mars meteorite **ALH84001** sample **N** fragments #3734, #3738 and #3739. The images of one of the fragments and the resulting CL spectra are shown in Plate 1. CL spectra were collected with micro-computer-based solid state multichannel analyser, integrated with a linear CCD-array silicon detector responsive from 200-1100 nm, has been interfaced within the optical chain of a MBX Cameca microprobe. The grains were also analysed with an SX50 microprobe at 20kV, 10nA and 10 second peak counting time. The small size and questionable stability of the mineral does not allow for greater counting times and higher beam currents. The sample had already been damaged by the use of high beam currents and exposure times.

These Ca-phosphates were often called whitlockite, however they are better described as β -Ca-phosphates as discussed by E. Dowty (2). The calculated formula closely matches that purposed by Dowty.

The CL spectra results are very preliminary and the peaks have been labelled as indicated by the probe analysis and CL spectral analysis of standards at the GSC. The more important aspect is that CL spectroscopy is a potentially powerful tool in the study of β -Ca-phosphates.

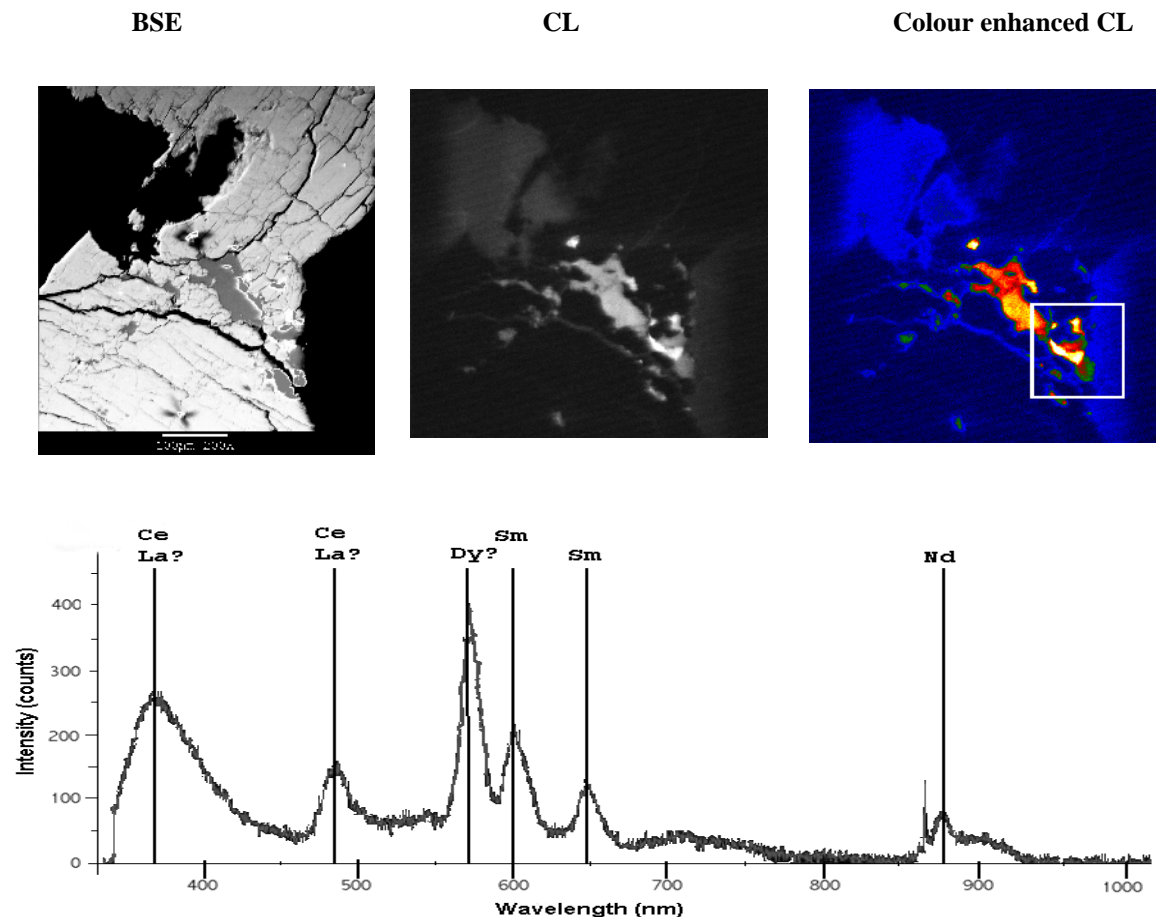


Plate 1: BSE, CL, and Colour enhanced CL images of grain #3738 ALH 84001-N. CL spectra of the “white” mineral marked by the square in the Colour enhanced CL image.

Table 1: SX50 microprobe analysis of β -CA-PHOSPHATES. Average of 8 analyses from 3 grains.

WT%	AVG.	SD	ATOM	FORMULA ON O=55
NA ₂ O	2.36	.08	NA	1.641
CAO	46.59	.76	CA	17.866
MGO	3.57	.08		-----
FEO	.78	.12		19.507
MNO	.04	.03		-----
SRO	.05	.07	MG	1.905
LA ₂ O ₃	.15	.07	FE	.234
CE ₂ O ₃	.44	.20	MN	.011
ND ₂ O ₃	.24	.17	SR	.010
SM ₂ O ₃	.12	.08	LA	.020
PR ₂ O ₃	.11	.10	CE	.058
EU ₂ O ₃	.03	.05	ND	.031
GD ₂ O ₃	.11	.09	SM	.015
DY ₂ O ₃	.00	.00	PR	.014
P ₂ O ₅	44.79	.96	EU	.004
F	.02	.05	GD	.013
CL	.01	.01	DY	.000
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TOTAL	99.41	1.46		2.315
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TOT-O	99.40	1.45	P	13.569

				13.569

			OH	.000
			F	.023
			CL	.009

				.032

REFERENCES:

[1] *Image Database of ALH 84001 and a Comparison to Chassigny, Nakhla and Zagami Martian Meteorites, Based on Cathodoluminescence Imaging* (1998) W. J. Protheroe Jr., et. al.

[2] *Earth and Planetary Science Letters* v35 (1977) 347-351.

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